AQA

AS LEVEL
CHEMISTRY

7404/1 Inorganic and Physical Chemistry
Report on the Examination

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General Comments

Examiners were pleased with the performance of students in this second sitting of this new exam. The mark distribution showed a good 'bell-shaped curve' around a mean of 45.7%, and every mark from 0/80 to 80/80 was achieved by at least one student. Although every single mark on the paper was achievable, students found questions that demanded a novel approach, differing from questions set in previous papers, very demanding. For example, only 9.2% of students scored more than four marks for question 03.3 and only 5.7% scored the maximum three marks for question 04.2. In common with previous years, there was evidence that some students did not take the time to read some questions carefully enough.

Question 1

01.1 This was surprisingly poorly answered. Many students were unable to write the electronic configuration for Fe^{2+}.

01.2 This question was generally well answered, but a significant number of answers had missing state symbols, despite the direct instruction to include them.

01.3 This was a familiar question and quite well answered.

01.4 The symbol including mass number was often incorrect. The calculation of A_r was straight-forward and done well by many students.

Question 2

02.1 This was poorly answered, with many students missing state symbols and balancing the equation incorrectly. Only the best students (24.6%) gained the mark here.

02.2 This proved challenging compared to questions set in the previous specification from this topic area. 34.3% of students failed to pick up even one mark.

02.3 Again challenging for all but the best students, only 26.3% scored more than one mark.

02.4 This was not as well answered as might have been expected. The fact that mean bond enthalpies are calculated using a range of compounds was not well understood.

Question 3

03.1 In this extended calculation the correct limiting reagent had to be used to gain full marks. This proved difficult for many students. The less able students were expected to be able to calculate the numbers of moles of the two reagents and/or state that $q = mc\Delta T$, but this was not always the case.

03.2 58.1% of students gained the mark for this question about a well-known practical issue.

03.3 This practical question was marked using a levels of response mark scheme. There was a wide range of answers, showing that most had done this sort of practical during their course. Nearly all students were aware that insulation is the most obvious improvement to the technique but many students failed to read the question carefully. Many answers, even

from the best students, described a technique but did not suggest clearly and then justify how the method given in the question could be improved.

Question 4

04.1 Only 36.3% of students gained this mark. The algebraic approach clearly proved difficult for many.

04.2 Few students took the most 'elegant' approach of taking the square root of both sides of the expression. As a result, those who attempted the question often ended up with a difficult quadratic equation to solve. This was a possible route to the correct answer, but far more difficult, and so most students failed to score all the marks.

Question 5

05.1 This was a straightforward definition that was reasonably well known, with 51.8% of students successful.

05.2 The second mark was rarely scored, perhaps showing that students had not read the question carefully enough. The best answers often included a good diagram to shown the interaction between molecules.

05.3 The shapes were quite well known, but the link with overall polarity less so. This question was a good discriminator, with almost even proportions of students scoring 0, 1, 2, 3 and 4 marks.

Question 6

06.1 The first equation proved very challenging, but the second one was answered better, with only 20.8% of students gaining both marks.

06.2 The reasons for removal of sulphur dioxide were quite well known despite the unfamiliar context; 86.3% of students picked up at least one mark on this question.

06.3 This question was very poorly answered and very few students scored full marks. The unfamiliarity of the context and the changes of units that were required led to 53.3% of students failing to score any marks at all.

06.4 This question proved much easier than the previous one. A much more familiar calculation meant that over half of students scored at least one mark here.

Question 7

07.1 The correct ion was identified quite often but the equation was much less well answered.

07.2 Even good students struggled with this question. The context of the ion test was the reverse of the common way of asking the question and, as such, poorly understood.

Question 8

08.1 Students showed admirable ability to calculate the oxidation states and 71.8% of students gained both marks on this question.

08.2 This was much better answered than the half equations in the 2016 AS paper 1, with 44.6% of students gaining the mark.

08.3 62.4% of students gained the mark for this familiar half-equation.

08.4 This question discriminated better than the previous two part-questions; surprisingly, 8.5% of students did not even attempt this.

08.5 56.3% of students were successful in gaining this mark.

08.6 Despite the challenging mole ratio, this question was answered better than question 06.3. The more familiar context of the question requiring manipulation of concentrations and volumes proved to be more accessible. The final answer required unfamiliar units and failure to grasp that aspect often limited students to three marks.

Question 9

85.7% of students scored here on this straightforward question about structure and bonding.

Question 10

63.6% of students gained this mark. This proved to be a relatively easy practical question requiring little application of knowledge.

Question 11

This mark was gained by 71.7% of students, showing that this is one of the easier physical property trends to remember.

Question 12

48.5% of students scored this mark; the most common wrong answer was D, showing that some students thought that a magnetic field is involved in TOF mass spectrometry.

Question 13

Only 26.2% of students selected the correct answer here, with all three distractors attracting significant numbers of students. Although this example is commonly taught, there are clearly not many students who can either remember the example or work out the probabilities for themselves.

Question 14

38.1% of students were successful. The most popular answer was C which shows that an incorrect formula ($NaSO_4$) must have been used by these students.

Question 15

Although 47.7% of students gained this mark, all three distractors attracted significant numbers of students.

Question 16

42.3% of students selected the correct answer. Most of the other students chose C – rinsing the walls of the conical flask with water. This is a common misconception and is clearly not well understood.

Question 17

A pleasing 66% of students could perform this relatively tricky calculation.

Question 18

Although 55.5% of students got this correct, a surprising number thought that methane (A) has a 90° bond angle – it was the most popular distractor.

Question 19

Students showed a good understanding of qualitative equilibrium ideas, with 64% gaining this mark.

Question 20

Although 47.8% of students scored here, the three distractors all drew significant attention.

Question 21

69% of students scored this mark.

Question 22

66.4% of students performed this calculation correctly.

Question 23

Only 42.2% of students selected the correct answer. Perhaps many students did not appreciate that a range of sulfur-based products are formed in the reaction.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.